THE NEW YORK ACADEMY OF SCIENCES

At the meeting of the Section of Geology and Mineralogy, January 7, the following paper was presented:

Volcanoes of Colima, Toluca and Popocatepetl: Edmund Otis Hovey.

Toluca is the oldest of the three volcanoes. A feature of greatest interest in the crater is the dome of vitreous andesite which welled up in the crater as the latest phase of the activity of the volcano and shows a certain resemblance to the cone of Mt. Pelé, with regard to origin. The volcano of Popocatepetl shows its composite character as a strato-volcano in the walls of the crater, and streams of lava have been among the features of the most recent eruptions. The volcano of Colima is still sending up a vigorous column of steam from its central summit crater. From this summit crater there poured out, in the latest eruption (1903), streams of very frothy lava which present a strange appearance on account of the porous character of the surface blocks. The same feature characterizes the streams of the earlier eruptions and has led some observers to the erroneous conclusion that flows of lava have not occurred at the volcano of Colima.

The major portion of the evening was then devoted to an examination of the exhibits of geology, paleontology and mineralogy in the New York Academy of Sciences Exhibition, under the guidance of the committeemen in charge of those exhibits.

At the meeting, April 1, Mr. Robert T. Hill gave a discussion of the tectonic structure of the northern part of the Mexican Plateau, which was published in Science for May 3.

Dr. Alexis A. Julien then spoke on the 'Evidence of the Stability of the Rock Foundations of New York City.' The general facts were reviewed which might justify the confidence of builders in the operations of extensive construction now in progress. Two former periods of enormous seismic activity in this region were considered, as recorded by the violent faulting produced at each time. The one, connected with the foldings, slips and shattering during the great Appalachian uplift, and now revealed by the numerous pegmatite intrusions cutting irregularly across the stratum of crystalline schists, probably effected during Cambrian time. The other, after the close of the Mesozoic, during the thrust of lava sheets between the sandstones and shales of the Newark series of New Jersey, now indicated by many faults across Manhattan Island and the adjacent Palisade Ridge. The long period of cessation of uplift, of ensuing subsidence and extensive surface erosion, offers the conditions in this region which promise long stability, notwithstanding the slight tremors noted at intervals of thirty or forty years. In the absence of disturbance of the glacial striæ, everywhere abundant, which serve as natural benchmarks to record changes of level or faulting, we obtain therefore direct testimony to the established absence of tremor during the long and approximately definite period which has clapsed since the passage and withdrawal of the continental glacier. In other parts of the Hudson River valley, however, some evidences of post-glacial faulting have been observed.

Alexis A. Julien,
Secretary of Section

THE ELISHA MITCHELL SCIENTIFIC SOCIETY OF THE UNIVERSITY OF NORTH CAROLINA

The 172d meeting was held in the main lecture room of Chemistry Hall, Tuesday, April 16, 7:30 P.M., with the following program:

Professor Archibald Henderson: 'The Foundations of Geometry.'

Professor Chas. H. Herty: 'The Optical Rotation of Turpentines.'

Alvin S. Wheeler,
Recording Secretary

DISCUSSION AND CORRESPONDENCE

THE CLOCKS OF THE GREENWICH AND U. S. NAVAL OBSERVATORIES

To the Editor of Science: In Professor Eichelberger's paper, published in your issue of March 22, 1907, he gives a comparison of the performance of six clocks, at various periods from the time of Bradley in 1750.

This table is primarily intended to show the

improvement made in one hundred and fifty years; but incidentally it brings out an apparently strong contrast in the performance of the clocks in use at Greenwich Observatory and the Naval Observatory, Washington. Clocks can now be made to give, under ordinary conditions, very fair and steady rates; but if greater excellence is required, than beyond the best possible mechanical construction, means more or less independent of the clock, as such, have to be devised to obtain it. For instance the Greenwich clock is kept in a room in which the temperature does not vary more than 5° F., and it has an automatic device to correct for barometric error. Thus its conditions are practically the same as those of the Washington, although attained by different means. The Washington clock is kept in an air-tight case in a room whose temperature varies say 5° C. A comparison then of the actual performances of these two clocks is of great interest. Professor Eichelberger's figures on page 451 fail to do this, and for these reasons:

1. The Greenwich Clock rates are spread over a period of one year, while those of the Washington clock only extend over three selected months.

2. The quantity $^s.015$ given in the table in the second column on page 451 is not comparable with $^s.051$ given for the Greenwich clock.

$^s.051$ is the mean deviation of the observed rate.

$^s.015$ is the mean deviation of the observed rate from one calculated from formulæ, and hence quite distinct from $^s.051$.

Professor Eichelberger, while admitting that his comparison is not valid, appears not to realize that it is altogether vitiated by dealing with periods of widely different deviation, and the fact that $^s.051$ and $^s.015$ represented two distinct phenomena seems to have escaped his notice.

It is, however, from the material he gives a simple matter to make such a comparison: the rates are taken from the table on page 451, and the column 'mean deviation' exhibits the difference of the separate rates from the mean rate + $^s.016$.

For the Greenwich clock the corresponding period of 1904 is first given, and in addition the same period of 1905.

It will be seen that the difference is really in favor of the Greenwich clock.

U. S. NAVAL OBSERVATORY CLOCK

	1904	Mean Daily Rate s.	Mean Deviation s.
Feb.	8–11	+ .019	.003
	11–15	— .014	.030
	15–20	+ .005	.011
March	1– 4	— .026	.042
	4– 9	— .010	.026
	9–16	— .022	.038
	16–18	— .043	.059
	18–22	— .022	.038
	22–25	— .029	.045
	25–28	+ .002	.014
	28–34	— .007	.023
April	3– 5	+ .017	.001
	5–13	+ .002	.014
	13–16	+ .026	.010
	16–19	+ .034	.018
	19–22	+ .002	.014
	22–31	+ .029	.013
May	1– 4	+ .113	.097
	4– 7	+ .082	.066
	7–12	+ .161	.145
	Mean	+ .016	± .035

Range $0^s.204$.

GREENWICH CLOCK

	1904	Mean Daily Rate s.	Mean Deviation s.
Feb.	8–12	+ .110	.078
	12–15	.123	.065
	15–19	.135	.053
March	1– 3	.180	.008
	9–16	.203	.015
	16–18	.235	.047
	18–22	.180	.008
	22–25	.206	.018
	27–30	.156	.032
	30–Apr. 1	.180	.008
April	1– 5	.191	.003
	5–13	.207	.019
	13–16	.223	.035
	16–19	.240	.052
	19–22	.227	.039
	24–29	.192	.004
May	1– 4	.220	.032
	4– 7	.207	.019
	7–12	+ .158	.030
	Mean	+ .188	± .030

Range $0^s.130$.

GREENWICH CLOCK

1905		Mean Daily Rate s.	Mean Deviation s.
Feb.	1– 4	—.243	.016
	6–12	.225	.002
	12–21	.225	.002
	21–March 1	.258	.031
March	2–12	.228	.001
	12–18	.220	.007
	18–24	.200	.027
	24–Apr. 1	.217	.010
April	1– 8	.222	.005
	8–16	.222	.005
	16–23	.178	.049
	23–May 1	.232	.005
May	1– 6	.248	.021
	6–12	—.274	.047
	Mean	—.227	±.018
	Range $0^s.096$.		

THOMAS LEWIS

TIME DEPARTMENT,
ROYAL OBSERVATORY, GREENWICH

REASONS FOR BELIEVING IN AN ETHER

SEVERAL weeks ago an article with this title appeared in SCIENCE. In it were mentioned two reasons for the belief in an ether; but what seems to me the most powerful of all arguments was not mentioned, nor is it often referred to elsewhere. It is alluded to by Maxwell in his article 'Ether,'[1] where we find these words:

> In the next place, this energy is not transmitted instantaneously from the radiating body to the absorbing body, but exists for a time in the medium.

The ether was originally invented to avoid the assumption of action at a distance; but there are no insuperable objections to action at a distance *provided it be instantaneous.* Herein lies the point of the argument. We have replaced the old question: "Can a body act *where* it is not?" by the far more searching question: "Can a body act *when* it is not?"

The energy sent out by the sun, for instance, reaches the earth after a lapse of some eight minutes. What of the energy during that time? The principle of the conservation of energy forbids our supposing that it is annihilated and recreated eight minutes later; and it will hardly be urged, I think, that it exists as a sort of disembodied spirit during that interval. There must be some medium in which it may reside during its finite time of passage from place to place.

The ether stands or falls with the principle of the conservation of energy.

PAUL R. HEYL

[1] Encyc. Brit., ninth edition, Vol. VIII., p. 570.

THE FIRST SPECIES RULE

THE article by Professor John B. Smith in the May 10 number of SCIENCE under the above title, in which exception is taken to the operation of the first species rule in the case of the lepidopterous genus *Rhynchagrotis* Smith, can hardly be considered as an argument against the use of this method of type fixing. His objection is against the selection of a doubtfully referred species as the type of a genus, a matter which is fully covered in most, if not all, codes and is *entirely independent* of the *method* of selecting types, whether by elimination or first species rule.

In the specific case mentioned by Professor Smith we fail to see that the species *chardinyi* selected as the type by Sir George Hampson was 'questionably referred,' as in the original description Professor Smith says: "The group, though placed with, and certainly very closely allied to *cupida,* yet shows so many peculiar characteristics that it would seem possible to separate it by a distinct generic term. The two species *rufipectus* and *brunneicollis* are, however, somewhat intermediate and as the species (*chardinyi*) can hardly be referred to *Triphœna,* I prefer to leave it here." Regarding this Professor Smith states in his recent article: "my reason for placing it there being that I believed it would prove to be properly referable to an exotic genus to which I did not care to risk making a synonym."

JAMES A. G. REHN

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